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Connecticut State board of fisheries and game report on the fish and game situation in Connecticut

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REPORT

ON THE

Fish and Game Situation in Connecticut

Made at the request of

Hon. EVERETT J. LAKE

Governor of Connecticut

November 2, 1921

AUTHOR AND COMPILER

F. C. WALCOTT

NORFOLK, CONN.

Connecticut. State board of fisheries and game.

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May 1, 1922.

F. C. Walcott, Esq.,
President State Board of Fisheries and Game
Hartford, Conn.

My dear Mr. Walcott:—

I wish to thank you sincerely for the report on the fish and game situation in Connecticut which you have prepared for me.

I wish that your Commission would have the document printed and distributed very widely throughout the state.

It contains much that is not only interesting but instructive, and I am sure will inspire the people of our State to help in the upbuilding of our fish and game possibilities.

With the intelligent aid of the people of the State, I am sure we can have in Connecticut not only a source of much real pleasure, but a very large opportunity to obtain an increased value of food product from this source.

I am sure the people of Connecticut will loyally support your Commission in its energies.

Very sincerely yours,

(Signed) EVERETT J. LAKE,
Governor.

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Introduction, Review of Present Conditions and Recommendations for the Future.

By Mr. F. C. WALCOTT.

October 26, 1921.

You have asked me to ascertain the facts concerning the protection and propagation of fish and game in the State of Connecticut, in so far as they relate to the existing Fish and Game Commission and to suggest ways and means of improving present conditions.

I have the honor to report the results of a preliminary investigation.

It has taken more time than I supposed it would to complete even a preliminary survey of the Fish and Game situation in Connecticut. But the fact that you have requested such a study has been the cause of genuine rejoicing among the Eastern conservationists for it is the first time, so far as I can ascertain, that a Governor of any state has requested the conservationist to set forth the facts and offer suggestions.

It is on account of your desire to get the facts impartially that those of us particularly interested in game and fish propagation and protection are anxious to submit a report which will sound an alarm and at the same time be constructive.

The first step in the investigation was to compare the results obtained by the Connecticut Commission with the Massachusetts, New York, Pennsylvania and New Jersey Commissions. This comparative table and the accompanying chart compiled from data furnished by the respective State Commissions, shows quite clearly the relative importance of the Connecticut activities in the rearing and killing of game in terms of an arbitrary unit of 1,000 of population. These figures indicate that Connecticut receives and spends less money in proportion to its population than any of her neighboring states, consequently raises fewer game birds and at a greater cost per bird. The deer have been practically exterminated from the State because of a continuous open season passed by the legislature five years ago.

A study of the present game laws of the State show that if the 27,000 sportsmen who obtained hunting licenses last season had been sufficiently assiduous to kill even half as much game as the law allows they would probably have exterminated the last remnant of game in the State.

There is a large amount of literature upon the subject of propagation and protection of both fresh and salt

water fish and I have obtained the opinion of some of the leading experts, some of them residents of Connecticut as to present conditions and future policy. These opinions are unanimous on three points.

1. That there is practically no good fresh water fishing left.

2. That the experiments in introducing foreign fish have failed.

3. That the present laws are too liberal if the fish supply of the State is to be restored.

Connecticut is the third most densely populated state in the Union containing 278 people per square mile. Massachusetts first with 429 per square mile and New Jersey second with 419. Connecticut has over three million acres and it is estimated that approximately one-third or one million acres are wild or semi-wild land, more uncultivated land than she had one hundred years ago. The area includes the freshwater ponds of which there are 918 with a total surface area of 43,497 acres and 7,619 miles of streams and rivers. In addition to this Connecticut has 150 miles of coast line and the three most important rivers, the Housatonic, Connecticut and Thames, run from north to south, furnishing ideal feeding lanes or routes for the migratory birds.

Connecticut's population is concentrated in cities and small manufacturing towns to an extent not found in any other state in the Union with the possible exception of Massachusetts. Hence, the importance of teaching the people of Connecticut, young and old, the beauties and benefits of the country that they may find the recreations they need in park, field and forest and on the water. A love of nature insures both health and happiness. It teaches people simple living. It has a moral and ethical value in the life of a community, state or nation, that is incalculable.

No one questions the enormous value of insectivorous birds to agriculture. No one any longer questions the desirability of enticing the working people afield for their holidays. Why cannot Connecticut lead instead of being at the tail end of the procession in the movement toward beautifying and restocking her waste areas with wild life, the balance of which man invariably upsets when left to himself to congregate and kill indiscriminately.

The Fish and Game Commission has been composed of one representative from each of the eight counties since 1913, thus making a Commission of eight. The Com-

missioners since the adoption of this form of voluntary service have been composed of men of the highest character, many of them well known through the State as public spirited men of large affairs. Many of these Commissioners have been willing and eager to give much of their time and thought to the fascinating subject with which they were entrusted, making it a kind of fad. But the prevailing opinion among the sportsmen of the State is that the fish and game are disappearing. A comparison between Connecticut and her neighboring States in the activities of their respective Fish and Game Commissions, in so far as it can be made, shows Connecticut at the bottom of the list and ones first impulse is to direct ones fire at the Commission which produced such negative results but a close study of the facts discloses weakness which no Commission organized as this Commission has been by counties could overcome.

The propagation and protection of non-migratory fish and game and the regulation of the killing of such fish and game are not county functions. They are State functions just as the regulations governing migrating fish and game are Federal functions. To decentralize a State's duties into Counties is fatal to good results. In the first place a large unwieldly commission, no matter how high grade its personnel, soon loses interest and ceases to function as a commission. It is fortunate if a president or chairman can be found who will bear the bulk of the work uncomplainingly with little but complaints for compensation. The President of the former Commission has served the State with a devotion most unusual. Divided responsibility begets inefficiency and the county system divides the responsibility for results among eight counties in the case of Connecticut.

The natural outlet for the activities of a Fish and Game Commission is with and in State reserves known as game sanctuaries but in Connecticut these are under the control of a Park Commissioner, an effective one apparently and well administered but not closely cooperating with the Fish and Game Commission.

Furthermore a Park Commissioner's duty is to make its first selections of land contiguous to large centers of population directly opposed to the first choice of a Fish and Game Commission who require low lying isolated tracts supplying natural food for birds and mammals and surrounded by semi-wild land for the game overflow.

The State Forestry Department upon which the Fish and Game Commission must depend for the treatment of

its reserves or sanctuaries has never closely cooperated chiefly because there are no important game sanctuaries in the State. It is the interdependence of these three departments which has lead many of the States to consolidate its natural resources and the administration of them under a Conservation Commission, a single headed responsible person of recognized ability as an organizer and administrator, thus fixing the responsibility and insuring complete coordination. The beneficial results obtained from this centralized authority in conserving and directing the natural resources of a state are almost incredible. The results obtained by New York, Massachusetts and Louisana under the direction of a conservation commissioner illustrate what excellent results can be accomplished in a comparatively short time.

This is an ideal toward which Connecticut should perhaps work but it is beyond the province of this report, although it is the firm conviction of the writer that the sooner there is a complete consolidation of the Forest, Park, Fish and Game interests under an expert administrator, the sooner the people of Connecticut will realize the wastefulness and inefficiency of the old methods and secure the benefits, physical and ethical, which the intensive centralized methods bring.

This report preliminary in its nature does not attempt to criticise former commissioners believing that they have been the victims of an antiquated method which could never rally to its support either public sentiment or goodwill. Even vision and enthusiasm vanish when subdivided eight times—so for the sake of brevity and directness more than for the sake of argument, let us forestall further comment upon the County Commission system and determine if possible what can be accomplished in Connecticut and how. Can the State of Connecticut furnish its citizens with fair shooting and fishing? What are the obstacles which today stand in the way of accomplishing this? If fair fishing and hunting can be supplied, is it a desirable thing?

The wide divergence of opinion even among those best qualified to advise, the lack of standardized reports and carefully itemized accounts which would enable one to determine the unit costs of game farming, the total absence of any figures on game killed and the fact that no scientific estimate or survey of the game and fish of the State has ever been made, greatly increases the difficulty of placing before Your Excellency enough accurate data to give you a clear picture of the existing state of affairs

in Connecticut. Therefore it seems advisable to make a preliminary report forthwith upon such facts as can be obtained in order to compare the Connecticut results with her neighboring states, Massachusetts, New York, New Jersey and Pennsylvania.

For the sake of clarity this report will deal first with game birds and mammals and their enemies and second with fish both fresh and salt water.

Broadly speaking, all lovers of nature throughout the United States and Canada long to have the forests and streams restocked with wild life. Every one subscribes to the principles enunciated in the New York State conservationist's creed: "That in a great democracy of free peoples the protection of wild life and the preservation of all other natural resources, which underlie national prosperity and happiness, must depend finally, as does the stability of the government itself, upon the support and willing service of every citizen."

In common with probably every one of the sportsmen in the United States, we should go a step beyond the protection and preservation of wild life. We believe that a man is a better man if he longs to go afield with rod and gun and dog, and the camera should be included; and that the realization of that longing brings him into close contact with the best, the most uplifting things in life. This is the best form of re-creation. The ultimate goal of nearly every true sportsman is to become almost unconsciously not only a lover of all nature, but an amateur field naturalist.

The real sportsmen of America are our best citizens—clean of mind and body, resourceful, strong and courageous. The sportsmen of the allied countries rid the world of imperialistic militarism, and the sportsmen of the civilized nations today stand as a solid bulwark against all forms of impractical and destructive radicalism. The love of nature—of clean, vigorous sport in the open—is the antidote to the softening, weakening influences of modern civilization. Our battle then is to recover the lost heritage which our ancestors wasted and failed to protect, and having regained it to protect it for our children and our children's children.

This is a many sided and a far-reaching question. It is nothing short of restoring the balance of nature interrupted by the growth of large towns and cities. Much progress has already been made toward this end, but the real progress has been made only in the last generation and a half, most of it in the last ten years and by a hand-

ful of devoted, self-sacrificing men to whom posterity will owe much. Reasonable success is now assured; the wild life can and will be saved. The best type of American citizen will persist and, with him, man's most wholesome companions, animate and inanimate—the dog, the gun and the rod. How can this be accomplished?

A skeleton outline of these principles and practices which have thus far stood the test of time and been adopted would include the following:

No public shooting can be maintained without thoroughly protected refuges.

Paid wardens are the only effective wardens. They must be kept in service throughout the year and promoted on the merit system to delevop an esprit de corps in the state and Federal Government organizations.

Violations must be punished to develop a respect for the law and, to apprehend the violators, a trained, skilful secret-service force is necessary.

The winter feeding of game and the control of vermin are important factors.

A single commissioner with full authority to take charge of all matters concerning the conservation of the state's natural resources has proved far better than the county system or the committee system, unless the members of such committee grant the broadest powers and fullest authority to the chairman of the commitee.

In a word, the most modern scientific business management is essential to success. A careful study of the best methods in use today should be made as the basis of a treatise upon the broad subject of game conservation, as a handbook for those interested in conservation. Such a treatise should include game breeding and feeding, forest protection and planting of suitable natural foods, the planning, selection and care of refuges, the regulation of public shooting near the refuges, the selection and care of overflow land or shooting areas near or contiguous to refuges.

The best methods of arousing public interest in conservation and clean sport and the education of school children to a better understanding of the virtues of field and stream are fundamentals to success. Many of these questions are regional and must be treated by zones with careful regard to the available amount of cheap, suitable land and watered areas for refuges.

There has been far too much generalizing in the past—loose and very general theories have been advanced, with little regard for the underlying biological facts and re-

gional variations. More extensive research departments or laboratories should be maintained by a few of the more important game-producing states and by the Federal Government under the direction of the bureau of Biological Survey to determine the exact biological facts relating to breeding, feeding and life habits of birds and mammals.

The Biological Survey should be frequently consulted to prevent duplication or overlapping, supplemented, of course, by the scientific work of the State. There should be closer contact and more frequent meetings between state and Federal officers.

In the eastern or more densely populated states there is ample opportunity for interstate parks and close interstate cooperation affecting the fish and game supplies for such parks, as well as forest control and the control of stream pollution. Most of the rivers and large streams are interstate.

The State Board of Education should cooperate in the fullest possible way in bringing before the school children the aims of the conservationists, the physical, moral and ethical values of a day afield.

There is a loud call to duty. Strong men are needed, men of experience and vision to mould public opinion, to turn the agitated mind away from city strife and rebellion against life, toward the sunlight.

It is the workingman and his family who need most the call of the wild. When their eyes are opened to the mysterious, mystic powers of nature, their gratitude will be expressed in terms of better citizenship, our State, our Country better, its people far happier.

Game

Statistical

Comparative record of fish and game activities, Connecticut, New York, Pennsylvania, Massachusetts and New Jersey.

New York State Game Farms cost,—Number of pheasants and pheasant eggs distributed.

Number of deer reported killed in Connecticut last five years.

Number of ponds and lakes in Connecticut—their acreage, mileage of fresh water streams.

	CONNECTICUT	No. per 1000 Pop.	NEW YORK	No. per 1000 Pop.	PENNSYLVANIA	No. per 1000 Pop.	MASSACHUSETTS	No. per 1000 Pop.	NEW JERSEY	No. per 1000 Pop.
Population 1920	1,380,631		10,384,144		8,720,159		3,852.356		3,155,374	
Number of Square Miles	4,965		49,204		45,126		8,266		8,224	
Density Population 1920 (No. per Square Miles	278		185		170		407		308	
Per Cent growth 1910-1920	24P.C.		14P.C.		14P.C.		14P.C.		14P.C.	
Season 1920										
Pheasants distributed	1,266	.90	9,911	1.00	3,961	.04	3,901	1.00	6,000	1.90
Pheasant eggs distributed	2,160	1.50	91,735	9.00	31,967	3.60	3,452	.89		
Pheasants killed	(Not report.)		35,855	3.50	23,000	2.60	1,977	.51		
Ruffed Grouse killed					507,600	58.00				
Deer killed	107	.07	20,000	2.00	3,000	.30	833	.20	522	.16
Ducks killed			123,601	11.00	40,000	4.50				
Number licenses issued fish and game	33,096	24.00	263,973	25.00	433,963	49.00	140,242	36.00		
Total Revenue from Licenses	$39,395.00	$28.00	$284,734.18	$27.40	$449,490.00	$51.54	$125,139.75	$32.74	$147,925.72	$46.88
Game Farm disbursements	$15,000.00	$10.86	$35,554.63	$3.41	$62,486.09	$7.17				
Approximate cost per pheasant distributed	$11.84		$3.58		*		$3.40			
Total disbursements Division fish and game	$41,986.00	$30.50	$366,943.57	$35.50	$246,051.88	$28.10	$220,000.00	$56.41		
Estimated value of fish	$227,645.05									
Estimated value game killed					$5,514,164.00					
Average annual Fish and Game Commission Expenses 1906-1916	$33,394.03		$586,447.74		$308,537.00 (game only)					

*Pennsylvania buys her pheasants at about $3.50 apiece.

Masachusetts owns 100,000 acres public land.

Connecticut owns 4,751 acres State Parks.

Connecticut owns and leases 4,430 acres State Forest.

Oregon has recently purchased 1,000,000 acres of public land, all of which will be held as game refuges.

Forest reservations New York State, which includes within its area the Adirondack Park, Catskill Park and the Lake George Islands; John Brown's farm; St. Lawrence reservations or International Park; State reservations at Saratoga Springs; Cuba reservations; the Curtiss Game Preserve; and the State Nurseries. Fish Hatcheries and Game Farm about 1,838,322 acres, of which about 255,000 acres is land under water. Comparatively speaking this tract is twice the size of the State of Rhode Island and larger than the State of Delaware.It is bounded by more than 9,000 miles of private land.

Minnesota has 55 game refuges exclusive of State Parks with an aggregate area of 2,557,430 acres.

Pennsylvania has 27 game refuges containing a little over 100,000 acres in which shooting is absolutely prohibited, but surrounding each game refuge, there are three to seven thousand acres upon which shooting in season is permitted.

CONNECTICUT
1922
THE GEORGE F. CRAM CO.
ENGRAVERS & PUBLISHERS
CHICAGO
Longitude West from Greenwich
Steam Railroads
Central New England ..... Am. Ry. Ex. F 2
Central Vermont ..... Am. Ry. Ex. L 5
New York, New Haven & Hartford ..... Am. Ry. Ex. I 5
South Manchester ..... Am. Ry. Ex. K 3
Electric Lines are shown on map thus.
Berkshire Street ..... D 1
Bridgeport & Danbury ..... E 8
Bristol & Plainville Tramway ..... G 4
Connecticut Company ..... E 8-G 7-H 5-N 7-P 3
Danbury & Bethel ..... C 6
Hartford & Springfield ..... I 2
New York, New Haven & Hartford (Elec. Lines) ..... D 8
Norwich & Westerly Traction ..... O 6
Rhode Island Company ..... P 3
Shore Line ..... I 7
Waterbury & Middale Tramway ..... G 8
Worcester Consolidated ..... O P 2
STATE FORESTS
(Name indicates location also)
A Cornwall Forest ..... 1,282 acres
B Simsbury Forest ..... 130 acres
C Union Forest ..... 328 acres
D Natchaug Forest ..... 1,986 acres
E Meshomasick Forest ..... 1,603 acres
F Mohawk Forest ..... 1,200 acres
ISRAEL PUTNAM MEMORIAL
Camp Ground, 370 Acres
Redding
STATE PARKS
No Name Location Acres
1 Sherwood Island ..... Westport 30
2 Hurd Park ..... East Hampton 455
3 Mt. Tom ..... Litchfield, etc. 219
4 Mt. Bushnell ..... Washington 84
5 Selden Neck ..... Lyme 122
6 Haystack ..... Norfolk 1
7 Ivy Mountain ..... Goshen 50
8 Mohawk Mountain ..... Cornwall 5
9 Great Hill ..... Portland 10
10 West Peak ..... Meriden, etc. 181
11 Mashamoquet Brook ..... Pomfret 13
12 Saptree Run ..... Pomfret 22
13 Macedonia Brook ..... Kent 1,701
14 Bolton Notch ..... Bolton 70
15 Dart Island ..... Middletown 1
16 Wharton Brook ..... Wallingford etc. 50
17 Buttonball Brook ..... Chaplin 135
18 Kent Falls ..... Kent 219
19 Hammonasset Beach ..... Madison 552
20 Black Pond ..... Middlefield 100
21 Devil's Hopyard ..... East Haddam 860
22 Lake Waramaug ..... Kent 75
23 Wooster Mountain ..... Danbury 100
24 Nathaniel Lyon Mem. ..... Eastford 60
25 Humaston Brook ..... Litchfield 7
Red Lines show the system of improved Trunk Line Highways as authorized by Gen. Assembly 1921.
Parallel Red Lines show unimproved sections of Trunk Line system.
Longitude West from Greenwich

AD-A231 184 DTIC ELECTE JAN 31 1991 S B D

NEW YORK STATE.

	1914	1915	1917
Estimated Commercial Valuation output Hatcheries and Game Farm ...	$215,454.62	$246,722.00	
Pheasants Distributed.....	2,949.00	6,479	9,141
Pheasants Eggs Distri.	31,096.00	52,015.00	65,049.00
Number of Farms	1	2	3
Cost of Maintenance and operation Div. of Fish and Game less Game Farm Expenses	$305,538.59	$357,437.82	$386,170.94
Game Farm Maintenance & Expenses	$7,254.02	$7,307.46	$32,433.74
Total	$312,792.61	$364,745.28	$418,604.68

	1918	1919	1920
Estimated Commercial Valuation Game Farm, Pheasants and Eggs		$54,708.50	$78,272.25
Pheasants Distributed	11,415	9,206	9,911
Pheasants Eggs Distri.	59,318	55,400	91,735
Number of Farms	3	3	3
Cost of Maintenance and operation Div. of Fish and Game less Game Farm Expenses	$421,045.72	$484,365.44	$550,893.11
Game Farm Maintenance and Expenses	$32,209.48	$32,073.14	$35,554.63
Total	453,255.20	$516,441.58	$586,447.74

CONNECTICUT

Deer Reported Killed.

Counties	1 Year. Aug. 1, 1915-1916	2 Years. 1917-1918	2 Years. 1919-1920
Hartford	279	145	27
New Haven	172	66	23
New London	220	90	33
Fairfield	118	46	11
Windham	169	118	24
Litchfield	351	174	51
Middlesex	156	82	13
Tolland	127	67	32
	1,591	788	214
	788		
	214	FOR FIVE YEARS—DEER KILLED 2,593	
	2,593	AVERAGE PER ANNUM 518	

Pheasants Distributed.

	2 Years	Per Annum	Eggs distributed 2 Years	Per Annum
1915-1916	2622	1311	5821	2910
1917-1918	2712	1358	6667	3333
1919-1920	2532	1266	4320	2160

FOR SIX YEARS PHEASANTS DISTRIBUTED 7866
AVERAGE PER ANNUM 1311
FOR SIX YEARS—
EGGS DISTRIBUTED 16,808
AVE. PER ANNUM 2,801

Mallards Distributed.

	Ducks	Per Annum	Eggs distributed	Per Annum
1915-1916	766	383	513	256
1917-1918	857	428	732	366

FOR FOUR YEARS—DUCKS 1623
AVERAGE PER ANNUM 405
FOR FOUR YEARS—EGGS 1245
AVERAGE PER ANNUM 311

Estimated Areas of Lakes and Ponds in Connecticut and total mileage of rivers and streams.

	Total area of lakes & ponds under 20 A		Areas between 20 & 100 A		Areas over 100 Acres	
	No.	Area	No.	Area	No.	Area
Fairfield County	85	420 A	20	813 A	10	2,248 A
Hartford County.....	97	555 A	25	1002 A	13	5,085 A
Litchfield County.....	62	394 A	24	868 A	19	4,957 A
Middlesex County....	51	340 A	12	943 A	14	6,007 A
New Haven County.	89	447 A	20	441 A	15	2,364 A
New London County	107	571 A	36	1024 A	25	8,297 A
Tolland County	50	289 A	12	1932 A	9	2,038 A
Windham County	94	451 A	27	636 A	8	1,375 A
TOTALS	635	3,467 A	170	7,659 A	113	32,371 A

113
170
635

Total 918

Total acreage of lakes and ponds..... 43,497
Total length of rivers in miles:
Fairfield County ..... 967 mi.
Hartford County ..... 1,206 mi.
Litchfield County ..... 1,631 mi.
Middlesex County ..... 495 mi.
New Haven County ..... 973 mi.
New London County ..... 917 mi.
Tolland County ..... 694 mi.
Windham County ..... 736 mi.

TOTAL ..... 7,619 mi

Above survey made in 1917 but no census of fish or fish food has ever been made.

Dr. William T. Hornaday, Director of the New York Zoological Society and the Permanent Wild Life Protection Fund, says, with reference to the Connecticut situation—

One point stands out clearly and that is that in view of all the circumstances it would be a good thing for some one to put out a circular and send it broadcast throughout the state of Connecticut, asking people "Which will you have, extermination or preservation?" and telling them that if they want preservation they have got to do some work and sacrifice some money in order to have it. They should be told that if they want any game preserved for the future in Connecticut, the people of Connecticut have got to wake up and conserve it just as the people of Pennsylvania have done.

It might be that an alarm gong beaten loudly and stridently would so scare the people of Connecticut that enough of them would wake up and do something so that the situation might be saved. I think the first step is the sounding of the alarm and the putting of the crucial question.

Let us look over the cards, as they lie face up on the table and see what they reveal.

First. We see glorious federal and state laws for the protection of the insectivorous and non-game birds, well observed in most places, but in some places shamefully abused by alien shooters. That abuse is because it is an utter impossibility for any state to put into the field enough wardens to watch every alien who goes out hunting with a license in his pocket.

Second. We now see game bird hunting, reduced, very largely, to the hunting of ducks and geese, with a very little shooting of six-shore-birds, quail and grouse.

Third. We see in the near future no wild game remaining save waterfowl, rabbits hares and white-tailed deer, and a trace of introduced pheasants. Anyone who thinks that quail and grouse of any species whatever can, by hand made propagation, keep the sport of shooting them on permanent basis, makes a sad mistake. It can not be done!

Fourth. We see that the propagation of pheasants on game farms is worth while, though it is not a great factor in the production of sport.

Fifth. As we have all said many times, guns and gunners are increasing at an enormous rate, while many kinds of game are growing more and more scarce; and the open seasons are entirely too long.

Sixth. We have seen that bag limits are not saving the upland game birds, partly because there are ten times too many bags!

Seventh. For land game we see all kinds of natural cover and food diminishing through drainage, cultivation, timber-cutting and fires. We see the natural enemies of the game holding it at great disadvantages; and the hard winters steadily are becoming harder and more destructive to feathered game.

Finally. We see that the resident hunting licenses fees in the various states, one and all, without a single exception, are ridiculously and absurdly below the real value of the sweeping wholesale privileges that they confer.

In 1911 we ascertained that 1,486,288 hunting licenses were issued by 27 states, out of our total of 48 states. Computing by averages the allotment of gunners for the 21 states then not issuing licenses, the total arrived at of sure-and-certain hunters in 1911 was 2,642,194. The number of other men hunting without licenses and contrary to law was believed to be sufficient to bring the total up to at least 3,000,000. Some competent authorities long ago estimated the total as high as 5,000,000.

Since 1911 there have been some very great increases in the number of licensed hunters.

Here is one index of that increase:

In 1911 New York issued 150.220 hunting licenses.
In 1915 New York issued 188,216 huntng licenses.
In 1918 New York issued 230,000 hunting licenses.

This means an increase of 80,000 since 1911, not counting the farmers and tenants who now may legally hunt game on their own farms without licenses.

In 1919 Pennsylvania issued 400,000 licenses. Now, it is estimated that 200,000 Pennsylvania farmers hunt on their own lands without licenses, but accordig to law, making a total of 600,000 active hunters in that one state.

What Can We Do?

Plant millons of berry, nut and seed bearing bushes, trees and plants as special food for wild birds. This will go far towards protecting cherries, grapes and other fruits from attack by robins and other birds that we can not kill. Good species to plant are wild cherry, mulberry, juniper, mountain ash, hawthorne and juneberry.

Feed upland game birds and other birds in winter about 10,000 times more than ever yet has been done, and provide shelters for quail.

Tie up all roaming dogs from May 1 to September 1 each year, and save the ground-nesting birds from their rapacious jaws. One free-hunting hound does more harm than 20 sportsmen.

Kill all hunting or traveling cats.

Kill weasels, coyotes, great horned owls, barred and screech owls, Cooper, sharp-shinned and duck hawks; and crows and night herons whenever they start in to feed on ducklings.

Confiscate the gun of every gunner convicted of killing game illegally, or of trepassing when hunting.

States like New York, New Jersey and Massachusetts, permit no alien to own or to use a gun. ("The Pennsylvania alien gun law is constitutional," says the U. S. Supreme Court.)

All gentlemen sportsmen will respect the rights of owners who post their lands against hunting; and all game-hog trespassers should be compelled to do so, by stringent laws and heavy fines. Farmers will not feed and protect birds when the sure result is an annual horde of insolent and defiant trespassers. In some states the acceptance of pheasants from a state game farm automatically opens that farm to free shooting! This is intolerable and can not endure.

If American sportsmen wish that sport in the open with the gun and rod shall sanely and sensibly be saved from EXTINCTION and established on a continuing basis, all they need to do to secure it is to ask for it, in clear and decisive tones!

It has been proven over and over that it is possible for wise and timely laws, adequately enforced, to maintain game and sport. More than that, in rare cases they have even brought back both from the edge of Oblivion. The white-tailed deer and elk are the most responsive of all our big game in coming back and re-creating deer-hunting. The wild ducks and geese can and do come back, when the seed stock is adequate, and the breeding and feeding grounds are not destroyed.

But the upland game birds are different. They are mostly non-migratory, winter and summer they are surrounded by enemies of many kinds, their food supply day by day and hour by hour is diminishing, and their natural protecting cover is being taken away from them. Nothing but quick work and strong and intelligent work is going to save any grouse and quail shooting anywhere in the United States for the future generations of sportsmen.

As instances of what sportsmen can do when they resolutely make up their minds, take the case of the geese and ducks of the United States. The stoppage of the sale of game and spring shooting has not only saved the sport of duck-shooting, but it has greatly increased it over what it was even ten years ago. Today it is the universal testimony that the supply of ducks and geese has enormously increased—since the migratory bird law was enacted. SPORTSMEN'S CLUBS AND THE PRIVATE LAND OWNERS HELP PRESERVE THE REMNANT OF OUR GAME. THE STATE MUST DO THE REST.

In Europe it has been proven over and over that private owners of large hunting grounds have preserved sport for centuries. The deer forests and the grouse moors prove it. But that game has not been cursed by millions of free shooters, each one asserting the rights of a sovereign, and sometimes quite able to defy owners while trespassing on fenced and posted lands. In "free" America our laws against trespass on fenced property are a howling farce. They are a disgrace to a civilized nation. They represent the fetich of "personal liberty" brutally thrusting aside the most fundamental of all property rights, the right to enjoy peaceable possession.

It is high time that every state should protect the fenced property of its citizens against armed and dangerous, and sometimes defiant, game-hunting trespassers.

I have said all that I have to say.

Pro. Henry Fairfield Osborn, the author of "The Age of Mammals," now solemnly says: "We are now at the end of the Age of Mammals!"

It is my fear that man's rapacity and greed for wild life now is so great that nothing will avail to save for the next century anything more of it than mere tattered remnants of a once glorious fauna,—rats, mice and English sparrows.

Dr. Leonard C. Sanford, naturalist and member of the Fish and Game Commission of Connecticut for eight years, gives the following review of the Connecticut situation on game and fish:

General conditions in Connecticut—small state, thickly populated. Large foreign population. Good roads, all covers, ponds and streams easily reached by auto. Automobiles greatest present menace to all game. Game legislation against auto in some states. Local methods for administrating penalties for game violation wretched.

County juror system poor. In every possible instance bring cases to Federal courts. Particularly urge co-operation with E. W. Nelson, head of Federal Migratory Bird and Game Organization of Connecticut.

Deer. I do not believe there are many in the state outside of parks. Advise their extinction by orderly legal methods.

Rabbits. Popular in some secttions. Unpopular in others. Recent commission did nothing toward propagating them because of divided opinion.

Upland Game—Partridges, Quail, Woodcock.

1. Partridges. More abundant in May 1921 than in recent years, statement made from observation and reports from Northern, Central and Eastern part of state. I believe the closed season for the years 1919 and 1920 and a good breeding season in 1920 and 1921 are responsible.

Only chance of preservation consists in occasional close year or years. Open seasons that are always short. Small bag limits. Effective Warden Service. Pheasant propagation to relieve ruffed grouse.
Sanctuaries absolutely important but should be selected and guarded carefully. I believe the present warden service remarkably good considering lack of funds. Advise new commission securing at once from old commission a list of wardens that have been found unsuitable. Undoubtedly many of these men will attempt to receive re-instatement.

Methods of Pheasant distribution up to July 1, 1921 useless and objectionable. Advise close cooperation with Massachusetts, Rhode Island and New York wardens as worst violating in Connecticut is along the state borders. Get complete list of suspected violators from old commission.

Quail. Negligible. No use in propagation because of weather conditions, south shore of Connecticut at present about the Northern limit of this bird.

There are probably from 4,000 to 6,000 in state. A large proportion of covers are easily protected and carefully guarded by land owners. Shooting does not apparently affect numbers.

Woodcock. Southern Connecticut a famous migratory route. This bird should receive every possible protection in Connecticut, especially in southern part of state. Migration at its height between October 15th and No-

vember 1st. This is a most important period for warden service. Assistant wardens and protectors should be used during this time. Cooperation with Federal authorities in the matter of woodcock violation essential. Every possible woodcock violation should be tried in Federal courts.

Ducks. Black duck and Broad bill (greater scaup) never more numerous. In greater numbers than between 1890 and 1900. Wood duck more plentiful than in fifteen years. This is of course due to stopping Spring shooting. Black ducks have been greatly helped by Mallard farms. I believe in propagating Mallards in suitable places because of effect on Black duck.

Sea ducks, especially old squaws have markedly decreased due probably to destruction on northern breeding grounds. Rail only of consequence on Connecticut river marshes. Local birds are shot up in first week of season. There is probably little change in numbers in recent years. Would cut bag limit to twenty and allow one gun but sixty for the season. **Rail are migratory birds.** Shore birds are practically negligible. Migration over mostly before September 1, season opens.

The Fish situation in the state is utterly bad and here the new comission has its greatest opportunity for results. Ponds, rivers and streams are all easily accesible in autos. All ponds and other rivers are fished out in the early part of season. The state is badly polluted, every effort should be made to get public sentiment in favor of clean water. There is only one good hatchery in the state. At least six are needed. Game funds cannot be used for fish purposes. Any extension of fish propagation will have to be paid for from rod license and special appropriation.

The most important fish to be cultivated in the state are native brook trout. Only open streams can be supplied by commission. Owing to the large number of posted streams in the state a comparatively small supply of trout would go a long way. I do not believe in salmon propagation.

White perch would be a most valuable fish to cultivate but the supply of all pond fish should be kept up. I believe in the general rule of keeping up the native supply. Don't put in new fish. Question of raising bait (smelt) for larger ponds should be considered. The destruction of salt water fry by small meshed nets all along the Connecticut shore of the sound is a most serious menace and requires stringent and well enforced laws. In this con-

nection it seems to me that one of the new commissioners should be well up in fish culture. There is no limit to the results that might obtain if the public realizes what it will enjoy if pollution can be reduced. The shad situation has improved much in the past two years owing to the legislation of 1919. When measures were taken to protect their spawning beds. The lobster situation is good. The work of the board has certainly produced results. Lobsters have steadily decreased in the past five years. There is no Atlantic State where lobsters have been more shamefully destroyed than in Connecticut. Even Labrador and New Foundland have long closed seasons which are strictly enforced. Connecticut sets out lobster pots 365 days in the year. It is a difficult matter to enforce the law on short lobsters and female lobsters except in the market.

Mr. John B. Burnham, President of the American Game Protective Association, has put the case of free public shooting as forcibly as anyone. His statement follows:

Events in the next few years in my judgment will determine whether we will continue our present system of free shooting in this country or adopt the European plan. In other words, whether the man who owns a gun and has the price of a box of shells and nothing more will continue shooting game or be wiped off the map for all time as a sportsman. We have been approaching this crisis threatening the elimination of free shooting for many years, but our innate Amercanism has fought against it. The organized sportsmen have originated expedients not possible in other countries and so postponed the evil day.

It is a legislative battle and an educational battle. Many people honestly believe that it is useless to try and preserve any shooting for the non-land holding sportsmen. The country is filling up so rapidly, and land increasing in acreage value so fast, they say, that to meet interest charges on the investment game must pay its share and be bought the same as any other crop. It is a fact, as they point out, that across the water, land dedicated to game raising produces a much larger harvest of game to the square mile than similar acres in this country, and they tell us that our only salvation lies in copying European methods and laws.

I do not agree with this, first, because our American system, which is the growth of a hundred and fifty years, is better than the European system, secondly, because I

do not think the necessity exists for discarding it. I believe it is better for a great many men in all walks of life to have moderate opportunity to hunt rather than this sport be confined to limited class. From the patriotic viewpoint, field sports furnish a practical antidote to Bolshevism on the one hand and on the other the experience thus gained best fits men for the raw material from which armies are made. Can we afford to sacrifice either of these national advantages? How would we be better off, to have game in greater abundance on smaller areas killed by a smaller number of men who had the price to pay for the sport even if this game were put on the market as a source of food supply? It is utilized as food in any case.

We might consider it if the necessity existed for making the change, but I cannot see that there is such a necessity. I admit at once the sacred right of property, and I do not believe that the land owner should be obliged to let Tom, Dick and Harry trample his standing grain in pursuit of game, but there is no reason why Tom, Dick and Harry cannot have a place to shoot as well as the club man. Two thirds of Connecticut is wild land where the shooter takes nothing the land owner provided and even in Iowa, perhaps the star agricultural state of the Union, there are 3,250,000 acres of non-tillable land, which is more land than the state of Connecticut. There is still ample room to gun provided the shooter is not put off the land.

So long as the ordinary shooter does not trespass on posted land, he has a fundamental right to take this wild game wherever he finds it. This country has a different law than that of any other country. It is that the wild game belongs, not to the land owner, but to the people. This is the decision of our highest tribunal, the Supreme Court of the United States. I believe in giving men of wealth every opportunity to increase the game on their land after European methods, but I do not believe in a dog in the manger policy which would tie up most of the remaining land while only a small portion would in reality be used for game propagation. Our laws today recognize just this point. They encourage the land owner to grow the game that experience has shown can best be increased artificially, and they give him the sole right to kill such game. As a corollary, should not the public have the right to shoot on non-utilized lands when no damage is done and the owner does not care?

A pshycological revolt against game laws and game protection. This wave has involved many shooters as

well as other citizens. It is a part of the general world unrest, and also a re-crudescence of our American outlawry against things "verboten." There are many factors entering into it, the high price of ammunition for one thing. This has caused cuts in appropriations and all kinds of bills to do away with game commissions or hamper their work. Many states have suffered in many ways.

Mr. Louis Agassiz Fuertes, artist and one of the foremost advocates of the conservation of wild life, writes in the October North American Review as follows:

It is significant that in countries where game is plentiful it often largely consists of species introduced from other lands, after the indigenous species had become so rare as no longer to afford good sport. The Asiatic pheasant have practically supplied the field of all Europe for two or three centuries, and are fast becoming the game-bird par excellence of the Northern United States. It is well, for herein lies about the last chance for survival of such splendid native species as the ruffed grouse, northern quail and several kinds of western grouse.

In such a country as ours, where each of the forty-eight States considers itself sovereign within its borders, and the game as its possession while present, it has been exceedingly difficult to arrive at satisfactory conservation laws and impossible to enforce them.

The Bureau of Biological Survey at Washington, eminently fitted for the task by virtue of its years of amassing detailed information as to the migrations, breeding habits, food and general economy of every species of American animal, was given the labor and responsibility of zoning the entire country and grouping States with respect to open seasons on all species of migratory game, and an opportunity of suggesting model laws for these groups of States, which should do away in large measure with the old border irregularities rising from the operation of variously different laws on the two sides of State, or even county, lines. This, now happily accomplished, plus the elimination of spring shooting of migratory game-birds and sale of game all over the United States, has already worked a marvelous benefaction upon most of migratory species.

The people most given to breaking the game-laws are aliens from Southern Europe, notably the Italians, who are inveterate small-bird hunters whenever they can get an opportunity. This habit they bring with them.

species of Central Europe, and few that travel that Italy is a natural bird-trap for all the migratory route get by. Italy has again and again been vainly appealed to by the other countries of Europe to cease the trapping, snaring, shooting, liming and other methods of catching the migrating species that for a season visit that penisula. There have been for a century few edible species that nest and rear their young in Italy as compared with Central and Northern Europe. It is easy to see the temptation our meadow-larks, robins, catbirds and flickers offer, and how little effort these new citizens in the "Land of the Free" exercise to resist it.

The weakest link in the chain of protection of game and other natural resources lies in the power of politics to change, at brief intervals, the personnel of those bodies of men who, by knowledge and experience, have come to be of inestimable value to this necessary work. This very year the Governor of a most important State so far undervalued the worth of its conservation machinery as to remove the most effective Commissioner the State has ever had; a man who, when public funds failed, privately supplied the necessary money in large amounts. The functions of the Commission were reduced to only a small section of the State and greatly curtailed in power even there. Over the rest of the State the efficient system of game wardens, men especially trained and instructed in the all year round care of the game and other wild life was abolished and the enforcement of the conservation laws was put into the totally inexperienced hands of the State constabulary; the supporting funds were withdrawn from the State game farms just as they were paying largely, both in material produced and in turning out well trained and efficient men capable of carrying on the work of wise conservation at a time when public interest was at the crest of the wave. It is such lack of appreciation and support as this which goes far toward killing interest, for the time at least, in the nation wide effort to preserve for posterity what is left of the once abundant and extraordinarily rich native fauna of this continent. And the time has come when even a temporary relaxation in so important a plan may mean the total loss of all that has been done. Some States have no organized State service, notably North Carolina, Florida and Mississippi, and some authorize the issue of almost unlimited hunting licenses, allowing the killing of more game than actually exists in the State. At large, however, the tendency seems to be ever toward the wise and proper

safe-guarding of the remnant, and the encouragement of all game and other innocent wild life to propagate and increase.

Much that was formerly considered "waste land," such as fresh water marshes, shallow lakes, river overflows, swamp woods and salt marshes with a wilderness of marginal cover has been reclaimed for agricultural and other uses only to be found entirely unsuited for these purposes because of wet sub-soil, tidal flow, salt, sour soil or sterile marly components which render it useless for any "practical" purpose. Like much of New England, which is best suited for (and should have been left) forest land, these wild areas really serve their best purpose as refuges for the support and propagation of the numerous species of wild birds that congregate to use them as nature has taught them to do. Even though many such areas now exist in a condition more or less sterile for these purposes, nearly all could by a little skillful planting and stocking be made valuable and attractive gathering places for the wild fowl which form the bulk of the migratory game of our whole land.

The Honorable George Shiras, 3rd, author and chief advocate of flashlight photography of game, who has long since given up the rifle for the more difficult and exciting sport of photography, is still one of our foremost authorities for the protection of wild life and believes in more and better shooting. He writes:

I believe that in any of the eastern states in which there is **sufficient cover and food,** a program that includes the following will insure satisfactory results:—

1. Game refuges—some closed throughout the year and others open for public shooting.

2. Systematic restocking with species adapted to local conditions.

3. Buck law for antlered game; low bag limits and prohibiting the carrying of guns during a closed season.

4. An efficient warden system, retention based upon character of service.

5. A license system sufficient to maintain a proper game commission and which must be composed of high-grade men and free from all political influence.

Under such conditions, there is no eastern state that cannot have a supply of game equalling or surpassig that of the pioneer days.

Mr. R. P. Holland, Vice President of the American Game Protective Assiociation, reports as follows, with reference to the activities of some of Connecticut's neighboring States, New York, Massachusetts, New Jersey and Pennsylvania.

New York State operates three game farms and has also set aside for recreational purposes, but not for game exclusively, two large parks known as the Adirondack and Catskill Parks. The New York Forest Preserve contains approximately 2,000,000 acres. The New York State Game Farms distributed to applicants over the state in the year 1918, 59,318 pheasant eggs. From the returns required by law, it was ascertained that 35 per cent. were hatched and the birds reared to the age of liberation. This same year the game farms planted 11,415 half-grown pheasants. Therefore, in 1918 her State Game Farms were responsible for approximately 33,000 pheasants.

New York State requires that all gunners report the game killed each year before they are entitled to a hunting license the following season. These reports show that in 1919 35,855 pheasants were taken. As the law permits only cock birds to be killed, it would appear that the number of cock birds taken by the gunners exceeded the number of hens and cocks produced by the game farms the preceding year. I believe this is good proof that New York's game farms are fulfilling their mission and are stocking the state with pheasants which are reproducing abundantly in the wild state.

In 1919 the New York Commission had 1,392 applications for eggs and 604 applications for birds. They distributed 91,735 eggs and 9,911 birds, a wonderful increase over the preceding year. For the fiscal year ending June, 1920, it is estimated that the commercial value of the eggs and birds distributed from the game farms and of adult birds obtained from breeding stock as approximately $78,272.25.

Below is a recapitulation showing how these figures are arrived at including the disbursements of game bird farms covering the same period:

DISBURSEMENTS, GAME BIRD FARMS

Salaries	$12,872.50
Wages, temporary	2.965.31
Maintenance and operation	19,716.82
Total	$35,554.63

(This of course, does not include the actual cost of game farms in first instance, nor is anything charged for depreciation.)

In the year 1918, 8,293 deer were killed in New York State. In 1919 when it was legal to shoot does, approximately 20,000 animals were taken.

From the reports made by gunners on the stubs of the 1920 licenses it was learned that during 1918 the following migratory birds were killed:

Ducks	109,663
Greater yellow-legs	3,556
Lesser yellow-legs	2,848
Coots	1,974
Geese	1,380
Rails	1,382
Golden plover	1,214
Black-bellied plover	1,045
Brant	241
Gallinule	216
Sora	82
Total	123,601

For the fiscal year ending June 30, 1920, $273,361.90 net was received by the sale of hunting and trapping licenses in New York State. Of this amount $32,000 was returned for non-resident licenses. Also, $11,372.28 was paid into the state treasury for non-resident fishing licenses. New York appropriates its money from the General Fund, and in this period the Commission expended for game protection $366,943.57 and for fish culture $159,831.82.

The New York Conservation Commission is encouraging the establishment of branch game farms by sportsmen's associations, these farms to hatch the eggs and rear the birds only. All eggs are produced at the state institutions. One or more of these farms have been proved very successful. Mr. Rogers of the State Game Farm takes great interest in them and gives them all the help and instruction necessary. The Broome County Sportsmen's Association received 4,540 eggs in 1920 and liberated 2,901 birds.

In Pennsylvania the Game Commission does not believe it to their advantage to operate a game farm. Instead, they purchase both birds and eggs from commercial dealers for the stocking of their covers. During 1920 they

expended $56,259.91 for the purchase of game birds and game bird eggs. This is exclusive of expressage and feeding until liberation. In 1919 they expended $28,115.60 for the same purpose.

Pennsylvania thoroughly endorses the game sanctuary —public shooting ground principle and they feel that because of the limited available supply of game for restocking purposes their efforts in this direction are negligible, as compared with the results of their work in protecting the native wild life.

They have in operation 27 game refuges and 7 auxiliary refuges, all surrounded by public shooting grounds. The state still has 10,000,000 acres of uncultivated land available for this purpose.

Twenty-five years ago Pennsylvania was shot out. Today the gunners of that state are furnished with a brand of sport that cannot be equaled in many states. Not only does it furnish the game, but Pennsylvania has gone farther and furnished her citizens with a place to shoot. This is the result of her game refuge—public shooting ground policy.

The maximum refuge is approximately 9 miles in circumference and they contain from 1,700 to 3,200 acres. Around each refuge are set aside from 3,000 to 7,000 acres of land that is a public shooting ground on which any man may go and shoot, provided he complies with the laws of state and nation.

Pennsylvania's report shows that in 1919 they purchased 3,961 pheasants and over 30,000 pheasant eggs and that approximately 23,000 pheasants were reported killed in 1920. Over 40,000 wild fowl, including shore birds, were reported killed in 1919.

The reports of the Pennsylvania conservation commission show that 3,300 deer were killed in 1920, 2,913 in 1919 and 1,754 in 1918. Four hundred thirty two thousand, two hundred thirty eight resident hunting licenses and 1,725 non-resident licenses were issued in 1920. This is approximately 5 per cent. of the population of the state and does not include approximately 600,000 farmers, who hunt and were not required by law to have a license.

The reports from this state give no statistics as to violations of the law or the number of records of convictions. All moneys go into the game fund and are expended for salaries of game protectors, purchase of game and general expenses of the department. In 1920, $308,537.97 was spent. Pennsylvania has authorized force of eighty

wardens in addition to her preserve keepers who have the same powers.

Those in charge of the conservation work in this state lay much emphasis on the necessity of caring for the birds on the refuges by planting fruit bearing trees and shrubs and feeding grain in severe weather. Their refuge keepers are constantly engaged in trapping vermin and the state game department also pays bounties for certain predacious animals.

Massachusetts operated three game farms and also has fourteen tracts of land set aside as bird refuges. In the year 1919 Massachusetts spent ....23,371.88 in propagation of pheasants, quail, mallard, black and wood ducks. Massachusetts also purchased some pheasants from commercial dealers. In 1919 this state liberated 1,481 young and 158 adult pheasants, 156 bob-whites, 2,218 young and 347 adult mallards, 106 wood ducks and 65 black ducks.

The average price of the limited number of pheasants offered for sale by commercial dealers ranges from $3 to $5 per bird. Up to this time Massachusetts had been unable to produce birds on her state game farms at these prices. However, in 1920 they changed their system and are now using incubators with a result that last year they distributed 3,452 eggs, 3,793 young pheasants and 108 adult birds.

In 1920, 1,225 pheasant cocks and 752 pheasant hens were reported killed. The game commission, however, does not feel that this is accurate and thinks that, owing in many instances to a wilful holding back of information, not more than 20 per cent. of the birds killed in the state yearly have been reported. Their report shows that in 1919, 883 deer were killed, of which 359 were does.

The breeding of ducks in Massachusetts has been practically abandoned, as they belive it is financially prohibitive to produce a mallard sufficiently wild to serve for stocking purposes. It has also been decided that the breeding of other species of waterfowl is unnecessary, as they are multiplying rapidly under Federal protection.

Massachusetts lays great emphasis on the necessity of caring for the game in winter. It is believed that the annual production at the bird farms and fish hatcheries is not in proportion to the increased number of sportsmen and fishermen who go a-field and that very little or no margin is left for the inroads on the stock due to un-

favorable breeding seasons, forest fires, cutting of covers, severe winters and ravages of vermin.

The law enforcement department is divided into twenty-eight districts, each in charge of a deputy. In 1920 the records show that they tried 288 cases for violation. In addition to this, 68 cases were reported and filed.

Massachusetts issued 96,369 hunting or combination licenses at a gross return of $100,590.25. For fishing in inland waters 42,959 licenses were issued with returns of $23,635.50. For lobster fishing 914 licenses were issued, which netted the sum of $24,549.50. This gives a combined total of 140,242 licenses issued by the Massachusetts department of fish and game with a net return of $125,139.75 in fees.

Very little of value is to be gained from the New Jersey report. They operated one game farm, but their report does not tell the number of birds or eggs produced, the cost of operation or the amount of game killed. Mr. Duncan Dunn, superintendent of the New Jersey State Game Farm, reported that he had a very succesful season last year at Forked River. Six thousand pheasants, 100 quail and 75 wild turkeys were raised to maturity.

New Jersey has a force of twenty-nine fish and game wardens. The amount received by the state treasurer during the year 1920 from th sale of hunters and anglers licenses was $147,925.72. The aggregate of fines collected from violators of the fish and game laws amounted to $15,926.15. During the short open season for killing deer in the state, 522 bucks were killed. It is estimated that the value of these deer was approximately $50,000.

One good point in the Jersey law allows the establishment of branch game farms under the supervision of the State Game Farm. A sum not to exceed $2,500 for each such farm is authorized for this purpose. The law provides that 75 per cent. of the game birds or animals raised shall be liberated in the county in which the auxiliary farm is located. The report shows that Burlington County has taken advantage of this provision in the law, and it is estimated that in 1920 they released birds valued at $2,748 and had a breeding stock on hand valued at $576. Since this report was printed I am of the opinion that another county has established its own branch game farm.

I believe the prosecution of trivial cases is nearly always a mistake. I can say always a mistake in the case of the first offense. Nothing is to be gained by a record of successful prosecutions built upon so-called technical cases.

I do not believe in permitting game wardens to unduly exercise their police authority. An over officious game protector will do much harm in a community, and a violation of the game laws does not call for the drastic action necessary in the violation of other criminal codes. When in the Federal service I always instructed a new deputy to treat men under arrest in a gentlemanly manner just as long as possible. There are, of course, occasions when this cannot be done.

I know that no game protector should go in the field without being armed, but I do not believe a side arm should be in evidence, and under no consideration should an officer enforcing game laws use a revolver except in self-defense.

As a commissioner having charge of the entire work in a state, I do not think it policy to trust too much to your subordinates. Hold the heads of the departments responsible for the faithful performance of their duties, but see to it that correspondence intended for the commissioner is taken care of by a secretary who will see to it that all complaints are brought to your attention and properly investigated. Whole-hearted cooperation should be given between state and Federal game departments. Each can help the other, and there is no room for jealousy in the work.

Below is a letter received from **John M. Phillips,** game commissioner of Pennsylvania, which gives figures of interest to every man whether he be a sportsman or not:

"Enclosed please find a statement covering the kill of game and the amount of furs taken in Pennsylvania in the season of 1920 as compiled by the Pennsylvania Game Commission. I have gone over this statement and it is correct, based upon reports returned by 8 per cent. of the licensed hunters. If anything, I think it is below the actual kill, as many returns were made from gentlemen who did not hunt at all and from others who killed a bear or a deer and were proud of their trophies—the latter would naturally pay little attention to small game. I am positive that the return on rabbits is below the actual kill, as we did not take into account those trapped by boys under 14 on the farms on which they reside.

"You will note that $449,490 was received in Pennsylvania last year from the sale of hunting licenses. The total kill of game, conservatively estimated, was worth $5,514,164, figured as a meat value of 40 cents a pound.

The value placed upon the furs taken during the same period was $3,000,000. This gives us a total of $8,514,164, which is 6 per cent. of $141,902,733. This is the value of our breeding stock of game to the commonwealth and we still have a substantial reserve in the old Bank of Nature.

"Although we do not raise English pheasants on game farms you will note that we have been successful to a certain extent, as in the season of 1920 we killed 42,000 of these birds. We also killed over half a million grouse, which we think too many, and had our bag and daily limits reduced in accordance with our revised game laws.

"We still have faith in our game sanctuaries, and this year we will have 32 of these miniature Yellowstone Parks scattered throughout the state in operation."

The Board of Game Commissioners of Pennsylvania have prepared the following table showing the amount of game animals and birds killed in that state. Only 8 per cent. of the gunners in Pennslyvania returned a report to the commission, showing the amount of game they killed last season. Taking the reports received from the 8 per cent., together with the number of licenses issued, the figures for the total amount of game killed were obtained.

Birds and animals, estimated kill, deer, legal bucks 3,300; bear, black 420; wild turkeys, 3,000; rabbits, 4,932,000; snowshoe rabbits, 70,200; squirrels, 1,250,000; raccoons, 82,200; ruffed grouse, 507,600; ring-necked pheasants, 42,000; quail, 79,800; wild geese, 2,640; wild ducks, 81,000; blackbirds, 309,600; reedbirds, 65,520; yellow-legs, snipe, rail, plover and woodcock,18,000.

This shows 7,427,280 pieces of game killed, or 13,785,410 pounds of choice meat, using a conservative weight for each piece of game. Figuring this meat at 40 cents a pound gives $5,514,164 as the cash dividend returned last year from Pennslyvania's game.

Mr. Donald McVicar, perhaps the leading authority in the country on the raising of game birds, reports the result of his experiments in the hand rearing of ruffed grouse "Partridges" at Norfolk, Connecticut:

I enclose my report of experiments carried out at Toby on the Childs and Walcott preserve and under my direct supervision. I have gone into detail pretty carefully and I am now quite convinced from the valuable data obtained in these tests that the problem of the ruffed grouse pro-

pagation by hand is, if not absolutely solved—on the direct road to be solved. The further development though must be in the hands of thoroughly experienced men who have had a wide and long experience in rearing game birds.

Experiment No. 1 carried out in 1916. Seven eggs hatched by a game bantam, Free Range Method. They were placed in a coop and small runway in the wood near entrance gate to Deer Park. After a couple of days in confinement I removed the runway. This gave the chicks liberty to roam around in search of their natural food. They kept very busy catching the aphids which clung to the undergrowth in quantities. This seemed to be their favorite natural food. I supplemented this with fine game meal and the yolk of a hard boiled egg sprinkled in front of the coop in which the foster-mother was still confined. After a day or two of this treatment, the chicks roamed off in search of food often getting so far that I had to carry one or two back within hearing of the foster mother's call. This method induced me to give the foster mother free range by letting her out of the coop every morning to wander about at will. I had to do a good deal of herding on account of the hilly nature of the ground and the flighty temper of the foster mother. The latter would often dart off up hill towards her coop at a rapid pace, occasionally leaving a stray bird which I had to locate by his call and carry to the coop. I continued the free range method though it involved continual vigilance, and an amount of herding of brood during showery weather.

The foster mother, a Game Bantam was not all an ideal of perfection, being wild and excitable, yet the brood was doing splendidly. When about a week old I lost one of the chicks mysteriously. I suspected a hawk or weasel. In a few days I lost another and this time was forced to the conclusion that the chipmunk was the culprit. While standing perfectly still and close to the coop, observing the brood feeding, a chipmunk darted out from a juniper bush close by, instantly the foster mother sounded the alarm, I also shouted and the offender scuttled back to cover after just having missed catching a chicken which he viciously struck at. I then moved the coop on to more open ground, at same time continuously using the free range.

I lost a third chicken and when about 3 weeks old I removed the brood and foster mother close to the Bungalow where I considered they would be safer. At this

time (3 to 4 weeks old) they began to pick grass seeds and wild ripe strawberries. I continued the egg and meal supplementary food, and allowed the foster mother and brood to roam around the house during the day. At night they were lured with feed to their coop and closed in. At 5 weeks old they began to tree roost at night. There was now 4 birds left of the seven. They were so tame that I could handle them at any time. When about full grown one flew into the kennel close by and was caught by the setters and killed. Early in September the three birds that still remained suddenly disappeared without any apparent cause. This I expected as I have noticed years ago that during that month the broods in the wild break up and disseminate over a wide area in ones and sometimes twos. About this time the young males began to strut and demonstrate their belligerent habits which would no doubt be resented by the old cock of the harem whose superior fighting experience would enable him to drive the youngsters off to look for new and unoccupied quarters. The lack of food around the native habitat too would be a ruling element as a cause of the September distribution. A few days after the disappearance of the three truants I found one, a female dead close by wire fence which she had evidently struck with force during a flight across an open stretch. The lower mandible was broken and the breast and throat lacerated and the wire close to where she lay held the feathers and blood.

Twelve days after the disappearance of the grouse the male bird returned to the bungalow alone and still as tame as ever. I caught him and put him in a pen.

This experiment at Toby proved that the free range method of rearing grouse could be successfully carried out under certain circumstances.

The necessary conditions are as follows. A fenced in area within the bounds of which is found the variety of brush timber such as grey birch, and fern etc., similar to that which is found in the natural haunts of the wild stock, where the insect life previously referred to is abundant the hand feeding would be much reduced, at the same time the broods would thrive all the better on their insect ration.

The objection to this method is the necessity for an attendant to be always on the spot to herd the broods into their coops when a storm is approaching. Generally the foster mother will do this if she is the right sort. Occasionally however, one may lag till the last moment and

get caught in the storm, to the detriment of the whole brood. If this brood had been in a vermin proof area and penned up before the September migration, I believe I would have successfully reared the entire lot of seven. While I can recommend this system as an excellent one. our second experiment worked out on a larger scale in 1917 prompts me to recommend the second method as the best of the two.

Three clutches were put down under bantams. Thirty eight young grouse were hatched out and placed in coops, 50 yards apart on a hill side not far from the bungalow in which I lived. The coops were placed among birches, ferns, wild grasses, and odd huckleberry bushes. In fact ideal ruffed grouse natural habitat. The weather was bad for sometime at first, in consequence of which there was a considerable decrease in the quantities of the flies. Therefore I had to depend on the meal and egg mixture as a staple food, varied with the addition of ant's eggs, and cottage cheese. The broods were liberated when a couple of days old from the coop runways, but the hens or foster mothers were kept in coops.

The lot did fine till about three weeks old notwithstanding the fact that the weather was very bad most of the time.

I was laid up for several days and had to send a young man to do the feeding. On my return to duty I found a lot of the chicks suffering from bowel trouble from which many died. This I attributed to over feeding. I found traces of food where coops had stood. This of course was stale and no doubt in my mind the cause of the trouble which I had great difficulty in checking. When a few days old the broods rambled a long way from the coops. They kept me busy herding them back to their several coops. Generally they would find their own way back. Odd birds though would go too far down hill. These I carried back. Many times I would miss several at feeding time, but after a wide search would come on them busy chasing the insects. For this system of rearing I recommend level ground. Hill sides are apt to entice the young chicks to roam too far from the coops.

The ultimate result of the second experiment was extremely disappointnig to me inasmuch as the aggregate raised was only 8 birds. Yet I consider the results as due to accidents which are under normal conditions avoidable.

A special pen about ¾ of an acre covered over with wire netting was constructed on natural ground, and into this eight birds were placed.

This is considered the most important experiment of the three and certainly the one above all others to be adopted in the propagation of grouse by hand rearing.

In the lot of eight, there were three males and five females, one of the females got killed in the pen by striking the wire when in rapid flight, and another female got through a hole in the roof of pen and escaped and was most likely taken by a hawk as she disappeared mysteriously.

The stock was now reduced to three males and three females. One male began strutting in September and dominated the other two so savagely that they were constantly driven to remote parts of the pen by the belligerent chief. When feeding in the mornings the two persecuted males would approach the other group to be instantly chased off by the top bird and in consequence had to be fed separately. All were perfectly tame, would feed out of my hand and scramble at times on to my arms. The king of the harem was very fond of a scrap and when walking through the pen he would suddenly appear and attack my boot and then when I stooped to guard him off he would strike out viciously at my fist. Towards spring time this bird of strife killed the other males. The three hens each nested and laid 31 eggs out of which they hatched 27 chicks. Thus once and for all proving that the ruffed grouse is absolutely polygamous and also that when provided with properly constructed pens on ground chosen as nearly as possible to represent the features of their natural haunts they will nest and hatch out their broods.

From the results of this experiment, I am now convinced that ruffed grouse can be as successfully reared by hand as any other game. My connection with the test ended before the birds nested, and consequently I was unable to devote any time to the special study of diet which I had intended doing.

As far as I have gone I believe I have already solved the problem of suitable food, at the same time I have a special article of diet already tested out with many varieties of game birds and foreign stock which I would next try out if an opportunity arises. If a success with grouse its use would simplify the dietary problem, which now is the only part of the scheme that requires further study. I do not consider the feeding in the slightest degree an obstacle to success. Allowing sufficient range for the broods to pick up their natural food, supplementing

this with some of the prepared game foods will insure success at the hands of an intelligent attendant who has the faculty of close observation and enthusiasm in his make up. In time, the correct supplementary food will be discovered, so that as a perfect substitute it can be used in times when weather conditions may cause a scarcity of the natural food of the young grouse.

Young stock intended for breeding in pens should be pinioned about twenty-four hours after hatching.

This operation incurs no risk when performed by experienced hands. It eliminates any danger of birds being hurt during flight. Full winged grouse take sudden flights in pen in play, and at great speed, where-by they are often injured by striking the wire.

Fish

The Honorable Hugh M. Smith, Commissioner of Fisheries, Department of Commerce, writes as follows:

"My dear Mr. Walcott:

Your letter was duly received and has been having my careful attention. I hope it may be possible for you to come to Washington in order to talk over Connecticut fishery matters. Meanwhile, I am glad to give you my views on several of the points raised in your letter.

In my opinion it would be a mistaken policy and a waste of money, time, and effort to attempt to establish in Connecticut waters the chinook or other Pacific salmons. The Connecticut River is no longer suitable for any migratory fish because of the large amount of tradewaste discharged into it and because of barriers below the sections to which such fish would have to go for spawning purposes. For a number of years various eastern states have developed a kind of mania for Pacific salmons for both the interior and costal waters, when there was not the slightest reason to expect that such fishes could be established. Particularly objectionable has been the planting of chinook salmon in inland lakes where the salmon have quickly cleaned out the native trout and other fishes and have then promptly disappeared from the scene, because, as it

is well known, it is impossible for a strictly migratory fish of this kind, which must pass a large part of its life in the sea, to become acclimatized in small landlocked waters.

In my opinion similar attempts to acclimatize in small lakes and ponds of Connecticut the landlocked salmon of Maine must prove unsuccessful. This species requires large lakes well stocked with its natural food, the smelt, and it can never become an important resource in Connecticut.

After a very careful review of the situation as it now exists in Connecticut, it is believed that the most profitable kind of interior fish culture for the state to undertake will be addressed to the brook or speckled trout, the rainbow trout, and the smallmouth black bass.

A small hatchery located on the Connecticut coast could handle such important marine species as winter flounder, tautog, sea bass, and the lobster. The flatfish is especially valuable as a commercial food fish of growing importance. It can be readily propagated and the plants from the hatchery will benefit the waters in which deposited, because this species has no marked wandering instinct. As you know, the winter flounder has a large mouth and is extensively caught by anglers.

Dr. Charles H. Townsend of the New York Aquarium can give you valuable advice as can also Dr. G. C. Embody of Cornell University. I take the liberty of calling to your especial attention Mr. John W. Titcomb, now of 379 Quail Street, Albany, New York, who has had a very wide experience in practical fish culture and is now a consulting fish culturist. He was for a number of years in charge of this fish-cultural branch of the United States Bureau of Fisheries and until recently held the position of State Fish Culturist of New York. It is believed that Mr. Titcomb can give you very great assistance in placing your fish-cultural service on a rational basis."

Dr. Charles H. Townsend, Director of the New York Aquarium, reports as follows:

Fish culture is on a fairly good basis now. It is quite possible to hatch and rear fishes in large numbers, but laws don't protect very thoroughly, pollution of waters is widespread and anglers are abroad in legions.

Stocking fresh waters is not difficult but getting satisfactory results is quite another matter, some lakes and streams have conditions that are naturally favorable, while others lack the natural food supplies that are neces-

sary for the growth and abundance of food fishes. Planting of fry has been done in most states promiscuously and unintelligently, the condition not being considered at all. Fishes cannot increase in waters of limited area, beyond their food supplying capacity. It is questionable whether waters in thickly populated states can, with all the science available, be made to yield satisfactory results. The public can take out fishes faster than they can be matured. It is easy to put them in.

There are protected reservoirs all over the country, where state commissions get young stock in abundance for distribution, but the public could soon clean them out if allowed to do so.

Good angling is desirable and wholesome for the people.

We should know more about the character of waters to be stocked and it need not take long to make the investigations.

The possibilities of small fish pond as sources of food for the people have received little consideration in this country and the actual breeding and maturing of fishes in such ponds is an art which we have yet to put in practice.

While certain foreign countries have long profited by the art of private fish culture, and have furnished notable examples, our own facilities for this industry have been neglected. It is probable that our resources in this respect are greater than those of other countries, as the United States already lays claim to the most extensive fish cultural operations carried on in the world, and nowhere is there so large a body of professional fish culturists as that connected with our national and state fishery commissions.

In these times when the value of running streams for water power is being widely considered, the possessors of brooks, springs and small lakes should be awakened to the value of their home resources for water farming.

It is gratifying to note that trout culture, in the hands of the private citizen, is making some progress in Massachusetts and adjacent states, and the advertisements of successful trout raisers may to-day be found in American journals devoted to fish and game. Trout culture, is, however, a branch of the work which requires special conditions, such as purity of water, comparatively low temperature, the construction of buildings and artificial fertilization. The possibilities for the private or commercial culture of many other kinds of fishes, which are

more widely distributed than the trouts and can be cultivated by simpler methods, should receive serious consideration.

In some of the countries of central Europe the cultivation of fishes in private waters has been going on for centuries. In Austria and Germany fish farming, as it is often called, is a common industry. While it is much practiced by small land owners, there are many large estates which maintain hundreds of ponds in active cultivation. Much of this private fish culture is based on the various forms of the carp, but other European fishes are also cultivated for sale, such as the tench, ide, ruff, bream, perch and pike. Some European fish culturists are now raising American basses and perches. There are many villages in Austria where fish ponds are maintained at the expense of the community. In view of these facts, it is remarkable that immigrants from Europe have neglected to practice their ancient art of pond culture in this country.

Aside from the commercial trout raising, which is practiced to a limted extent, we have nothng of such pond culture in America. Our numerous fish hatcheries maintained under the direction of state commissions are devoted almost entirely to the stocking of public waters with young fishes. Very little of the product is reared to maturity and none is sent to market direct. If our fish culturists should be commanded to bring their annual yield of fry to maturity and deliver it to the market, they would be at a loss how to proceed. We are really not fish raisers, but producers of fry. At that stage our efforts cease. The rest is left to nature, and negligently cast into waters that we imperfectly protect and utterly neglect to keep pure. While our achievements in public fish hatching are notable, private fish culture has made no headway. A few of our state commissioners are making efforts in pond culture for the benefit of farming communities, notably in Kansas, and it will be interesting to observe what progress can be made. Perhaps the vast natural yeld from our coast, lake and river fisheries is responsible for the lack of private effort.

Our fish supply, in general, is large and well distributed, but we could consume a much greater supply, especially in view of the fact that in some sections the natural supply is being depleted by over fishing and pollution of waters. There are many sections of the country inadequately supplied with fish food which could be produced

locally by pond cultivation and such supplies would find convenient home markets.

It is possible for the private citizen to obtain pond fishes for breeding purposes, but he needs assistance and direction. Object lessons on approved methods of fish culture could be obtained by visiting public hatcheries, but this is not likely to be undertaken. It would be advantageous to the country if state fish commissions generally could supply the coarser fishes for cultivation in private waters and furnish the public free information as to the methods to be followed.

State fish commissions should not only prepare inexpensive pamphlets on the cultivation of common fishes, but see that they reach many communities and be announced and reviewed by the rural press everywhere. Model ponds distributed about the state for demonstrative work would, of course, be educational, like agricultural colleges and state experiment farms. I am not prepared to set forth the best means of doing this work, perhaps no two states would undertake it the same way.

I am convinced that some of the energy put into the production of fry is misdirected. The output is amazing; six billions last year by the National Bureau and perhaps as much more by the states. Practically all of it is hurried into the nearest river and none of it raised. We are all going about the same thing and have settled into the rut of fish hatching in hatchery buildings. No one is doing anything new except as connected with the competition for increased output.

Having practiced these wholesale methods for two or three decades, let us now consider whether we might not profit by a little less fish hatching and a little more fish raising. Does salvation lie only in a multiplicity of expensive federal and state hatcheries? If our fishery establishments were equipped to raise and market one per cent of the fry now being hatched and liberated, might not the quanity of food thus produced exceed that which eventually reaches market by the way of public waters? Let us simplify our art and teach it to the people, for they can surely help in the production of fish food.

On Stream Pollution.

We have not only disregarded our fresh waters in most of these respects, but we have carelessly permitted them to become polluted. The pollution of public waters is our most common act and our most uncivilized practice.

The casting of refuse in a stream results only in transferring it from one neighborhood to another.

The great evil with which practical fish culture in America has to contend at the present time is the contamination of public waters by sewage and the refuse of manufacturies. Although the propagation of fishes by artifical means has, in this country, reached a degree of efficiency unequalled in other countries, the preservation of streams in conditions desirable for maintenance of fish life has been singularly neglected.

In a majority of those States which possess fishery resources there exists more or less effective restrictions upon fishing and the operation of fishery industries, but it is seldom that enactments against the depositing of waste matter in the waters are enforced.

All of our fish commissioners of experience, both national and state, are agreed that the decrease in the supply of food fishes is traceable more to pollution of waters than to any other cause, and stream pollution is going on at a rate porportionate to the increase in population and the development of manufacturing industries. The effects of pollution are most serious in the more densely populated states. It begins almost at the source of streams and extends to the very mouths of the largest rivers.

The effects of pollution of the harbor of New York are liable to become very serious, as the amount of sewage is increasing. There are bottom deposits of sewage in many parts of the harbor that are several feet in thickness. Many forms of marine life which assist in the disposal of organic matter in the harbor must decrease in numbers, and disappear as the volume of sewage increases, while the shad, oyster, and other fisheries are already suffering from its effects.

The Blackstone is the most polluted river in New England; its name has become synonymous with filth. The headwaters of a river system are usually free from pollution but in this case the opposite is true. The sewage from the city of Worcester befouls the river at its source, and thereafter through its whole extent the Blackstone is a damaged resource to the country. Such is the accumulation of filth in the mill ponds that from some of those near Worcester there arise odors that are detrimental to comfort and realty, if not health. The use of its water in boilers has long been abandoned and it cannot be used in the manufacture of light colored clothes.

There is no legal justification for the pollution of water, yet so universal is the practice that it has come to receive

moral justification at the hands of society, and meets no general condemnation except where it goes beyond the bounds of human endurance. A few states in the Union have recognized the damage arising from water pollution and have made intelligent investigations for the purpose of correcting the evils.

It is claimed that more than 130,000 persons visit the State of Maine every year on vacation, to fish or hunt. These summer visitors bring into Maine from six to twelve millions of dollars a year, or more than thirty per cent of the total value of all farm crops raised in Maine.

Many of the northern states, notably Michigan, are visited in summer by legions of tourists, largely on account of the good angling to be had in their waters, and the lakes of all America have become summer resorts for an important proportion of the people.

The Honorable R. B. Stoeckel of Norfolk, an ardent fisherman, who has given much study to the protection and propagation of fish: who knows intimately the fish situation in Connecticut, makes the followng interesting observations and recommendations:

For The River Systems of The Connecticut River. Native Trout.

A hatchery to be centrally located, probably somewhere in the Farmington Valley to supply all the head waters whch are yet suitable for native trout.

Each system of head water streams to have its best tributary spring brook segregated as a breeding brook, to be under State control during its whole length; all stocking to be done for the system in that brook and the fish when large enough will stock the main system. No fishing to be allowed on the breeding brook and as a matter of protection it must be chocked with brush and rubbish so that fishing is impossible.

A concrete illustration for your own purposes is supplied by an example of the system in Norfolk. If the Robbins Brook, which is a spring brook and which breeds about all the trout for the Black Berry system should be chocked with brush its whole length, stocked and protected all the streams in the Black Berry system would furnish good fishing for large trout in the Course of three years.

Trout Other Than Natives.

I do not believe in any kind of foreign trout such as brown or rainbow. They are failures in our streams and there is no reason why the native trout can not be brought back by stocking.

Stocking.

Stocking must be done aggressively by the State and fish placed in localities selected by the State under the direction of the Commission.

Farmington and Housatonic Rivers.

In the lower reaches of the Farmington and through the whole length of the Housatonic river intensive breeding of bass and perch would bring rapid results. There is at present a bass hatchery at Lake Waramaug.

It is possible for the State to maintain a number of hatcheries for what one or two have been costing .There is no reason why the principal of rotation can not be carried through one hatchery so as to keep it running all the time providing there are enough breeding ponds. Some of our best fish spawn in the spring, while trout spawn in October and November etc. The same crew at the same hatchery might be working all the time.

The Connecticut River.

Shad fishing could be brought back in the Connecticut river by an adequate hatchery at or near Windsor and by protection both by new laws and by enforcement during the first five years. After that there would be so many shad that you could continue to waste them for twenty years.

The Connecticut river throughout its length, in Connecticut is suitable for pickerel, pike and bass. It is no longer a possible salmon river except by going to a great expense for fish-ways.

For the River Systems East of the Connecticut River.

The territory east of the Connecticut river is similar to that on the west and the problem is the same.

A hatchery to be placed in a suitable portion of either Windham or Tolland Counties for a similar distribution of fish. Trout at the head waters, perch and bass at the flat portions of the big streams.

In a general way this covers stocking of the interior running waters.

Lakes.

Each lake should be specially studied. The old fashioned fishing must be brought back in all the mud bottom ponds, sloughs and creeks. That is, they must be heavily stocked with pickerel and perch.

To return to a local example. Any of the ponds in Norfolk could be brought back to the conditions of twenty years ago by such methods and absolute protection for two years (viz Goshen pond, where it is now possible to catch a hundred pickerel any time.) There are certain of the larger and clearer ponds with which experiments might be made. For instance Twin Lakes typical of several ponds in the State, raises many great lake white fish. The pond is literally alive with them but as they are a deep water fish and because it is against the law to use a gill net only a few are caught and those illegally.

After the experience of the past two years and after a study of the situation I do not believe in the Chinook salmon unless he is to be raised and fished for with nets He is too hard to catch in the lakes to be a good sporting fish or much of a factor as a food supply. I can give data and details regarding Chinook fishing in Massachusetts, New York and Connecticut which will demonstrate this point.

Therefore it is a fair conclusion that most of the lakes ought to be stocked with the indigenous fishes and that those ought to be increased by propagation and stocking to a point where any farmer's boy can get a mess in season.

There are fifty miles of stream in each, the Housatonic and Farmington which raise only a few insignificent fish and which might be made to raise tons of food by intensive work. All this means money. Money can be raised only by educating the public to the necessity of a fish license. A fish license at from $3 to $5 would raise ample money to support all necessary hatcheries.

Pollution.

The whole subject of pollution of streams is, to my mind, for the present immaterial except so far as it relates to the shell fish proposition.

The Naugatuck river, from Torrington down is the only river in the State of which I personally know which is so polluted that it will not raise fish. The other rivers are not bad and the lakes throughout are comparatively clean and healthful.

What the State now possesses in the line of hatcheries and their output is absolutely inadequate; good enough

as far as they go; but not ample enough; new work along these lines is needed. It will be entirely possible if you desire to have it done, to get together groups of men who would personally finance the hatching of fish for sale to the State or who would finance the building of a hatchery as a private corporation. All these things can be worked out. What is needed is someone with personality, experience and energy to get into it and father the project.

A Report By John W. Titcomb, An Expert Consulting Fish Culturist, on "Black Bass Culture, as Applied to the State of Connecticut."

Nearly all species of fishes distributed by the Board of Fisheries and Game are susceptible of propagation by artificial methods and can be produced in numbers limited only by the funds available for fish cultural operations. Both the largemouth and smallmouth black basses and allied species constitute a partial exception, however, since their eggs cannot be artificially manipulated. For supplies of such fishes, it is customary in most states where there is a demand for them, to depend upon the natural reproduction of brood fishes held in ponds prepared for the purpose.

A series of such ponds usually range in area from one-fourth to one acre, the shape and size of each being dictated by economy in construction. They are so arranged that it is possible to have an independent water supply and drainage. Thus the removal of the fish is facilitated and an abundance and variety of aquatic vegetation which supports the minute animal life upon which the little basses subsist, as well as performing other important functions, is regulated.

The cultivation of these fishes, therefore, usually consists in providing a series of artificial ponds which shall give to the maximum number of breeding fish and their young all the essential conditions of a natural environment, while at the same time protecting them as far as possible from their enemies.

The expense involved in the establishment of a well equipped pond culture station varies all the way from $50,000.00 to $100,000.00.

At most places where pond cultural operations are conducted, it is customary to depend upon some adjacent

public fishing water, as a source of supply for brood fish, the bass being caught as they are enroute to their natural spawning grounds.

Unless there are unusually favorable facilities for keeping the parent fish in brood ponds, it is customary to release them, after the spawning function, in the larger waters of their origin.

In other words, several hundred brood bass are removed from a large body of water in order to get their progeny under control. The progeny is then distributed in small allotments to many waters.

During the early stages of their existence, young bass in breeding ponds are exposed to dangers of many kinds, just as they are in the larger waters of their natural habitat, although not in the same magnitude. Snakes, frogs, turtles, various water insects, fish-eating birds and mammals, all are destructive to the fry, while the young of the same school prey upon the weaker ones. The natural spawning period extends over six or eight weeks and the earlier broods of fry prey upon their younger brethren. The losses from cannibalism among the little basses are undoubtedly greater in the confines of artificial breeding ponds than among the little basses hatched in the larger waters.

The degree of success attained both in natural waters and in artificial ponds varies with the season and is governed largely by the state of the weather and other natural conditions beyond the control of the Commission. Located, as they are, along the shoal margins of the ponds, the nests receive the full effect of atmospheric changes. A sudden fall in temperature will often cause the parents to desert their nests, and as the eggs and fry are extremely sensitive, they are frequently killed or their development injuriously retarded by the cold.

Another unfavorable feature resulting from the location of the nests in shallow water is that it subjects them to the full force of surface drainage and washings, following heavy rains. Roily water is extremely injurious to the ova and young of the black bass, and heavy rains and sudden temperature changes are conditions which must be expected during the season of the year when these fishes spawn. In the breeding ponds efforts are made to regulate these conditions, but the results of pond cultural operations are hazardous and uncertain in the extreme. One year a station may have a good output, and the next year, under apparently similiar conditions, very few young fish are produced.

The following resolution was adopted by the American Fisheries Society at its Fifty-first Annual Meeting at Allentown, Pennsylvania, September, 1921.

Whereas, It is well recognized by fish-culturists that the artificial propagation of both large and small mouth bass is impractical upon the large scale practiced in the propagation of other food and game fishes, and that it is well recognized that increase of these species by reproduction under natural conditions is ordinarily more than sufficient to maintain nature's balance in waters inhabited by these species, and that the removal of parent fish from their nests results in the loss of from 500 to 25,000 helpless fry,

Resolved, that under the intensive angling of the present day, supplemented by the many new and alluring devices cast at the quarry, the conservation of these two important game fishes is necessarily dependent upon the proper protection of the parent fish during the entire period that they are spawning and caring for their young, supplemented by due precaution to maintain in all bass waters an abundance of bass food.

For the foregoing reasons the U. S. Bureau of Fisheries as well as State Fisheries Commissions engaged in the propagation of the basses frankly state that "only sufficient numbers of bass for a brood stock will be furnished," or words to that effect.

A brood stock usually means from one to three cans of little bass from one-half inch to three inches in length, the number to a can varying from 250 to 1,000, it being impossible to carry more than one-fourth as many of the larger fingerlings as of the one-half inch fry. The applicant who has been accustomed to receive pike perch or yellow perch in million lots, or some species of trout in lots of several thousands, is naturally disappointed.

The introduction of this small amount of fish to waters of such large range as the basses require, will show results in waters not already inhabited by bass, and it is the proper method of stocking new waters. Their introduction into waters already inhabited by the same species is a mere bagatelle as compared with what nature will accomplish if the bass already there are permitted to spawn unmolested and protect their nests until the fry have left them.

It is well known to anglers that the male bass, both largemouth and smallmouth, protect the nest while the eggs are incubating and for a short period after the fry have hatched, after which time the young scatter to forage for themselves. While protecting its nest, the bass resents any intrusion and will seize almost anything dropped upon the nest. He will take even an unbaited hook dragged over it. The capture of these guardians of the eggs and very young fry is easy and requires no skill.

But it is a conservative statement to say that for every adult bass removed from the nest, there is a corresponding destruction of from 500 to 25,000 eggs or fry, the amount from each nest exceeding the average number of little bass supplied by fishery officials on each application for stocking purposes.

In normal seasons the basses have finished spawning in most Connecticut waters on or before July first. During a very late spring the spawning season in cold water lakes may extend well past the middle of July.

If the nesting bass are protected until the first of July, (as provided by the statutory close season) it is believed that in waters suitable for them they will be able to maintain themselves by natural reproduction to the limit of the natural food supply.

However, there may be occasions when the angler will have an opportunity, in open season, to exercise self-restraint—by refraining from taking father bass while he is attempting to guard his nest or young brood.

Both of the basses (largemouth and smallmouth) are non-indigenous fishes which were first introduced to Connecticut waters about fifty years ago. They are naturally warm-water fishes, the largemouth especially so, but have in some instances been introduced into cold-water lakes and ponds better suited to some species of trout. In these colder waters the basses cannot be made to yield so large a crop as in the warmer waters. One of the several reasons for this is the fact that the colder waters produce less bass food than do the warmer waters.

Fortunately, there are two opportunities to improve the bass fishing without resorting to large annual expenditures.

The first is by legislation for the protection of immature fish. The present statutory limit as to the size of bass which may be lawfully taken, coupled with an ever-increasing number of anglers, with new and ever increasingly destructive lures, results in keeping the number of mature fish reduced to a minimum. It is seldom that a bass is sufficietly mature to spawn when only eight inches long and when a female of such small size is mature she will produce comparatively few eggs. With the growth of another year her productive capacity would at least be trebled. It must be kept in mind that the fish crop is one to be harvested under certain wise restrictions, just as one harvests poultry or other live stock—always with an eye to protecting a sufficient breeding stock to maintain the supply.

From the foregoing it will be seen that if the statutory limit on the size of bass which may be lawfully killed is increased, there will be a much greater increase in the number of fry annually produced under natural conditions.

It is probable that if the limit is placed at ten inches, the resultant increase in the number of small fish will be all that the natural food supply upon which the minute fish must depend for sustenance will provide for.

In addition to this opportunity to improve the bass fishing by legislation which will allow more fish to reach maturity before they spawn, the Board of Fisheries and Game has found a substitute for expensive pond culture methods which promises to be more productive and involves less expense in operation. It consists in the use of reservoirs of municipal water works as a source of supply, not only for basses but also for other desirable warm water fishes, notably the yellow perch, pickerel and bullheads. Already arrangements have been made with certain city officials for the privilege of using nets in reservoirs where angling is prohibited. The privilege makes it possible to catch and distribute to public ponds and lakes fishes of all sizes from yearlings up to large adults. The extent to which this work can be carried on is dependent upon the number of reservoirs upon which fishing privileges are obtained and otherwise limited only by the amount of funds available for defraying the expense. It is needless to say that work of this character will be done under strict sanitary regulations, having the approval of the State Department of Health.

From the foregoing discussion the following points may be summarized:

The basses are not susceptible of propagation by artificial methods.

It is impossbile to furnish them to applicants in numbers proportionate to the species artificially propagated.

The present close season to July first is adequate legislative protection for the spawning bass. There may be a few cold water lakes or ponds in which the bass do not finish spawning until after July first. Adequate protection should be afforded them not only during the entire period when they are on their nests but also by a statutory limit as to size which may be lawfully killed of not less than ten inches.

Bass fry and fingerlings in quantities ordinarily supplied are adequate for stocking waters not already inhabited by the same species.

The amount of young fish annually produced varies with seasonal conditions, and a corresponding variation in the fishing from season to season may be expected.

The annual stocking of bass-inhabited waters with the comparatively small number of fry or fingerlings which it is possible to produce by pond cultural operations amounts to little. The Board of Fisheries and Game cannot consistently ask the legislature to appropriate the large sum involved in the establishment of a pond culture station.

As a substitute for an expensive pond culture station the Board of Fisheries and Game has arranged with officials in charge of muncipal water works for the privilege of removing bass and other warm water fishes with a view to transferring them to public lakes and ponds.

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